

CLAIMS

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1. A method of backing up and restoring data in a computer system, the method comprising:
 - 1 defining a logical backup object;
 - 2 specifying one or more collapsed extents; and
 - 3 recording details of the collapsed extents.
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1. 2. The method of claim 1 further comprising:
 - 1 starting data movement between a host and the backup and restore system; and
 - 2 monitoring data movement.
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1. 3. The method of claim 2 further comprising:
 - 1 receiving a completed signal; and
 - 2 in response to the completed signal, halting the monitoring of the data movement.
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1. 4. The method of claim 2 further comprising repeatedly defining a logical backup object, specifying extents, starting data movement, recording details of the specified extents and monitoring data movement from a first storage unit to a second storage unit until all data is transferred to the second storage unit.
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1. 5. The method of claim 2 further comprising restoring data by:
 - 1 creating empty objects to restore into;
 - 2 discovering the extents of the empty objects;
 - 3 reading the extents of the backup objects; and
 - 4 specifying a mapping from backup extents to restore extents wherein at least one of the extents corresponds to a collapsed extent.
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1. 6. A method of backing up data used in a computer system having a client, a primary

2 storage system and a backup storage system, the method comprising:
3 discovering one or more actual extents on the primary storage system;
4 collapsing the extents; and
5 specifying the collapsed extents to the backup storage system.

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2 7. The method of claim 6 wherein collapsing the extents comprises:
3 identifying a pattern in the actual extents discovered on the primary storage
4 system; and
5 generating a representation of files specified by the actual extents which is more
6 compact than the representation provided by the actual extents and defining the
representation as a collapsed extent.

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2 8. A method of restoring data from a backup and restore system to a host, the
method comprising:
3 creating empty objects on host to restore into;
4 discovering the extents of the empty objects;
5 reading the extents of the backup objects; and
6 specifying a mapping from backup extents to restore extents wherein at least one
7 of the extents corresponds to a collapsed extent.

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2 9. The method of Claim 8 wherein specifying a mapping comprises specifying pairs of
extents which identify the backup extents and the restore extents.

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2 10. The method of Claim 8 wherein specifying a mapping comprises:
3 identifying whether both back up and restore extents is striped;
4 in response to both the back up and restore extents being striped, identifying
5 whether both back up and restore extents have the same column width and column count;
6 in response to both the back up and restore extents being striped, identifying
7 whether both back up and restore extents start at the beginning of a stripe element;
compute a number of repetitions; and

8 generate a single restore extent for the number of repetitions.

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1 11. The method of Claim 8 further comprising:
2 monitoring data movement.
3 receiving a complete signal; and
4 in response to the completed signal halting the monitoring of the data movement.

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1 12. A backup and restore system for backing up and restoring files to and from a
2 primary storage system coupled to a client, the backup and restore system comprising:
3 a processor for defining a logical backup object;
4 a collapsed extent processor for specifying collapsed extents;
5 means for starting data movement; and
6 an extent recording processor for recording details of collapsed extents.

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1 13. The system of claim 11 further comprising means for logically restoring a logical
2 element from a segment of storage on the primary storage system.

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1 14. The system of claim 12 further comprising a processor for specifying a mapping
2 from backup extents to restore extents wherein at least one of the extents corresponds to a
3 collapsed extent.

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1 15. The system of claim 13, wherein said means for logically restoring comprises:
2 means for creating empty objects to restore into;
3 means for discovering the extents of the empty objects;
4 means for reading the extents of the backup objects; and
5 means for specifying a mapping from backup extents to restore extents wherein at
6 least one of the extents corresponds to a collapsed extent.

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1 16. The system of claim 13, wherein the means for logically restoring comprises means
2 for specifying pairs of extents which identify the backup extents and the restore extents.